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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,389	05/24/2007	Shingo Okamoto	060659	9276

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EXAMINER	
MOWLA, GOLAM	
ART UNIT	PAPER NUMBER
1723	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/594,389	OKAMOTO ET AL.	
	Examiner	Art Unit	
	GOLAM MOWLA	1723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 November 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-17* is/are pending in the application.

5a) Of the above claim(s) *6-8,11,12 and 15* is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-5,9,10,13,14,16 and 17* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment of 11/16/2011 does not place the Application in condition for allowance.

2. Claims 1-17 are currently pending. Applicant has amended claims 1, 4-5 and 14 and added new claims 16-17. Claims 6-8, 11-12 and 15 are withdrawn from consideration as being part of non-elected invention.

Status of the Rejections

3. Due to Applicant's amendment of claims 1, 4-5 and 14, all rejections from the office Action dated 08/17/2011 are withdrawn. However, upon further consideration, a new ground of rejection is presented below.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-5, 9-10, 14 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (US 2002/0148499 A1) in view of Kawamata et al. (JP 05-245622 A).

Regarding claim 1 and 16-17, Tanaka discloses a method of manufacturing a solar battery (solar cell string) (figs. 4 and 5) ([023], [0044] and [0068-0073]) by electrically connecting a

plurality of cells (solar cell 10) to one another using connection members (interconnector 22), comprising the following steps in the order named:

- a flux applying step of applying a flux to surfaces of the cells (10) ([0071]);
- a disposing step of disposing the connection members (22) over the adjacent cells (10) to which the flux has been applied ([0072]) (fig. 5); and
- a string step of connecting the connection members (22) to the cells (10) by soldering ([0073]), wherein the flux is applied before the soldering (see [0071] and [0073]).

However, Tanaka is silent as to a cell heating step of heating the cells connected to the connection members.

Kawamata is directed to a formation of reliable soldered parts (see abstract). Kawamata discloses that flux containing solder is reheated after soldering in order to remove the flux to form reliable soldered parts ([0013-0022]).

Although the references are not in the same field of endeavor, namely method of forming solar battery, both the references are directed to forming soldered part using flux containing solder. Thus, one skilled in the art would have reasonable expectation of success by incorporating the teaching of Kawamata in the method of Tanaka such that the cells are reheated after soldering in order to remove the flux residues to allow for reliable soldering between the surfaces of the cells (10) and interconnection member (22). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have incorporated a cell heating step in the method of Tanaka after the cells are connected to the connection members

such that the flux residues are removed in order to provide reliable soldered part, as taught by Kawamata.

Regarding claims 2 and 3, Tanaka in view of Kawamata discloses the purpose of the cell heating step is to remove the flux, and therefore, the heating temperature must be greater or equal to boiling or activating temperature to dry out the flux. Alternatively, it would have been obvious to one skilled in the art at the time of the invention to have determined the optimum temperature for the cell heating step by routine experimentation such that flux is removed, and in order to remove the flux, the cell heating step must be performed at a temperature greater or equal to boiling or activating temperature of the flux. In addition, in the case where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation (MPEP § 2144.05 IIA) (*In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

Regarding claims 4 and 5, Tanaka in view of Kawamata further discloses that a heating temperature is 150°C and a heating time is two minute (see [0019] of Kawamata). Although the reference is silent as to whether the heating time is three minutes, it would have been obvious to one of ordinary skill in the art at the time of the invention to have determined the optimum temperature and time of cell heating step through routine extermination such that the flux applied to the surface of the cells (10) is removed, as desired by Tanaka in view Kawamata. In addition, in the case where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation (MPEP § 2144.05 IIA) (*In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

Regarding claim 9, Tanaka in view of Kawamata further discloses that the whole cells (10) are heated in the cell heating step ([0019] of Kawamata).

Regarding claim 10, Tanaka in view of Kawamata further discloses that the cell heating step includes: heat release means (heating furnace) ([0019] of Kawamata) for preventing a solder which connects the connection members (22) to the cells (10) from being molten (cell heating step is performed at 100°C, which is lower than the temperature required to melt solder) ([0019] of Kawamata).

Regarding claim 14, Tanaka in view of Kawamata further discloses that in the cell heating step, the cells (10) are heated such that residue of flux is removed from the surface of the cells (10) (Kawamata discloses heating step [0013-0022] to remove the flux).

6. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (US 2002/0148499 A1) (hereafter "Tanaka '499") in view of Kawamata et al. (JP 05-245622 A) as applied to claim 1 above, and further in view Tanaka et al. (JP 2003-168811 A) (hereafter "Tanaka '811").

Applicant is directed above for complete discussion of Tanaka '499 in view of Kawamata with respect to claim 1, which is incorporated herein. Tanaka '499 in view of Kawamata further teaches that hot air is blown against the connection members (22) to perform the soldering (see [0073] of Tanaka '499) and the cells (10) are heated by a heating furnace ([0019] of Kawamata). However, Tanaka (US 2002/0148499 A1) in view of Kawamata is silent as to whether the cells are heated by irradiation with an infrared ray during the cell heating step.

Tanaka '811 discloses a solar battery (figs. 2-3) by electrically connecting a plurality of cells (photovoltaic cell 1) to one another using connection members (tab lead 4). Tanaka '811 further teaches that the use of infrared heater (9) is conventional in the art to heat the photovoltaic cell (1) (abstract and [0008-0009]).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to use the infrared heater of Tanaka '811 in the cell heating step in method of Tanaka '499 in view of in order to efficiently heat the solar or photovoltaic cell, as taught by Tanaka '811.

7. Claims 1-5, 9-10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carey et al. (US 5,466,302) in view of Kawamata et al. (JP 05-245622 A).

Regarding claim 1, Carey discloses a method of manufacturing a solar battery (solar cell string) (figs. 1-4, most particularly fig. 2) (2:33-5:5) by electrically connecting a plurality of cells (solar cell 10 and solar cell 11) to one another using connection member (metallic interconnect 14'), comprising the following steps in the order named:

- a flux applying step of applying a flux to surfaces (12' and 13') of the cells (11 and 12) (Pb-Sn solder cream 15' and 16' which comprises 15% by weight flux) (see example II);
- a disposing step of disposing the connection member (14') over the adjacent cells (11 and 12) to which the flux has been applied (fig. 2); and
- a string step of connecting the connection member (14') to the cells (10 and 11) by soldering (see example II).

Carey discloses the use of a single connection member (14'). Although Carey is silent as to the use of a plurality of connection members to electrically interconnect solar cells 10 and 11, it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art (*St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8).

However, Tanaka is also silent as to a cell heating step of heating the solar cells (10 and 11).

Kawamata is directed to a formation of reliable soldered parts (see abstract). Kawamata discloses that Pb-Sn based cream solder comprising flux is reheated at 100-150°C after soldering in order to remove the flux to form reliable soldered parts ([0013-0022]).

Although the references are not in the same field of endeavor, namely method of forming solar battery, both the references are directed to forming soldered part using Pb-Sn based cream solder. Thus, one skilled in the art would have reasonable expectation of success by incorporating the teaching of Kawamata in the method of Carey such that the cells are reheated after soldering such that the flux residues are removed to allow for reliable soldering between the surfaces (12' and 13') of the cells (11 and 12) and interconnection member (14'). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have incorporated a cell heating step in the method of Carey after the cells are connected to the connection members such that the flux residues are removed in order to provide reliable soldered part, as taught by Kawamata.

Regarding claims 2 and 3, Carey in view of Kawamata further discloses that a heating temperature of the cell heating step is not less than a boiling or activating temperature of the flux

(Carey in view of Kawamata discloses that the flux are removed and therefore the heating temperature has to be greater or equal to boiling or activating temperature to dry out the flux).

Regarding claims 4 and 5, Carey in view of Kawamata further discloses that a heating temperature is 150°C and a heating time is two minute (see [0019] of Kawamata). Although the reference is silent as to whether the heating time is three minutes, it would have been obvious to one of ordinary skill in the art at the time of the invention to have determined the optimum temperature and time of cell heating step through routine extermination such that the flux applied to the surface of the cells (10 and 11) is removed, as desired by Carey in view Kawamata. In addition, in the case where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation (MPEP § 2144.05 IIA, *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

Regarding claim 9, Carey in view of Kawamata further discloses that the whole cells (10 and 11) are heated in the cell heating step ([0019] of Kawamata).

Regarding claim 10, Carey in view of Kawamata further discloses that the cell heating step includes: heat release means (heating furnace) ([0019] of Kawamata) for preventing a solder which connects the connection members (214') to the cells (10 and 11) from being molten (cell heating step is performed at 100°C, which is lower than the temperature required to melt Pb-Sn based cream solder).

Regarding claim 14, Carey in view of Kawamata further discloses that in the cell heating step, the cells (10 and 11) are heated such that residue of flux is removed from the surface of the cells (10 and 11) (Carey in example II discloses cleansing step, and Kawamata discloses heating step [0013-0022]).

8. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Carey et al. (US 5,466,302) in view of Kawamata et al. (JP 05-245622 A) as applied to claim 1 above, and further in view of Gonsiorawski et al. (US 5,074,920) and Tanaka et al. (JP 2003-168811 A).

Applicant is directed above for complete discussion of Carey in view of Kawamata with respect to claim 1, which is incorporated herein. However, the reference is silent as to whether in the string step, hot air is blown against the connection members to perform the soldering, and in the cell heating step, the cells are irradiated with an infrared ray to heat.

It is well known in the solar or photovoltaic art to blow hot air against the tabbing/connection member to perform soldering effectively, as taught by Gonsiorawski (see example 1).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to blow hot air against the tabbing/connection member to perform soldering as taught by Gonsiorawski in the method of Carey in view of Kawamata such that the connection member is soldered effectively to the surface of the solar cell.

Tanaka discloses a solar battery (figs. 2-3) by electrically connecting a plurality of cells (photovoltaic cell 1) to one another using connection members (tab lead 4). Tanaka further teaches that the use of infrared heater (9) is conventional in the solar or photovoltaic art to heat the photovoltaic cell (1) (abstract and [0008-0009]).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to use the infrared heater of Tanaka in the cell heating step in method of Carey in view of

Kawamata and Gonsiorawski in order to efficiently heat the solar or photovoltaic cell, as taught by Tanaka.

Response to Arguments

9. Applicant's arguments with respect to claims 1-5, 9-10, 13-14 and 16-17 have been considered but are moot in view of the new ground(s) of rejection as necessitated by the amendments.

On pages 6-8 of Remarks, Applicant argues that Tanaka '499 fails to disclose a method as required by the amended claims.

This argument is directed to the claims as amended and is moot in view of new ground of rejection as provided above.

On page 10 of Remarks, Applicant argues that Carey is directed to the use of fluxless solder cream and the interconnects can break due to high temperature required for soldering.

The examiner respectfully disagrees. Although Carey is directed to the use of fluxless solder cream, Carey in example II explicitly discloses the use of flux containing solder. "The use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain." *In re Heck*, 699 F.2d 1331, 1332-33, 216 USPQ 1038, 1039 (Fed. Cir. 1983) (quoting *In re Lemelson*, 397 F.2d 1006, 1009, 158 USPQ 275, 277 (CCPA 1968)). See MPEP §2123.

In the instant case, the use of patents (US 5,466,302 to Carey et al.) as references is not limited to what the patentees (Carey et al.) describe as their own inventions (use of conductive

Ag-silicone paste or Pb-Sn fluxless solder cream) or the problems with which they are concerned (solar cell breakage). They (use of flux containing solder) are part of the literature of the art, relevant for all they contain.

In addition, a reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments (*Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989)) and disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments (*In re Susi*, 440 F.2d 442, 169 USPQ 423 (CCPA 1971)).

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence/Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GOLAM MOWLA whose telephone number is (571) 270-5268. The examiner can normally be reached on M-Th, 0800-1830 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, ALEXA NECKEL can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/G. M./
Examiner, Art Unit 1723

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1723